

THIRD ORDER SUSCEPTIBILITY OF GOLD SULFIDE SOL

by

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Third order Susceptibility of Gold Sulfide Sol

Gold sulfide colloid was prepared by mixing equal concentrations of a sulfur sol and a gold sol. The mixture was heated to 85 °C for 15 minutes.

The sulfur sol was prepared by dissolving solid sulfur in hydrazene then adding distilled water. This was followed by heating for 30 minutes at 75 °C.

The gold sol was prepared by reducing gold chloride with 1% sodium citrate. The mixture was heated and stirred at 85 °C for 30 minutes.

The UV-Visible spectrum of gold sulfide sol is shown in Figure 1. The final concentration was 7.1×10^{-3} M.

The phase conjugate signal intensity was measured using degenerate four-wave mixing (DFWM). The experimental arrangement used is shown schematically in Figure 2. Briefly it consisted of a lens A which focuses the beam on the sample. The optical density filter B was used to vary the intensity of all three beams. Beam splitters BS1 (5%T) and BS2 (50%T) were used to generate the probe, front pump and back pump beams respectively. All beams arrive at the sample simultaneously. The beamsplitter BS3 is used to pick off the conjugate signal which is then focused on a photodiode detector and displayed on a Tektronix 2465 300 MHz oscilloscope. The beam intensity was measured by another detector placed between the sample and the back pump beam and displayed on another Tektronix oscilloscope.

The intensity of the phase conjugate signal used in these

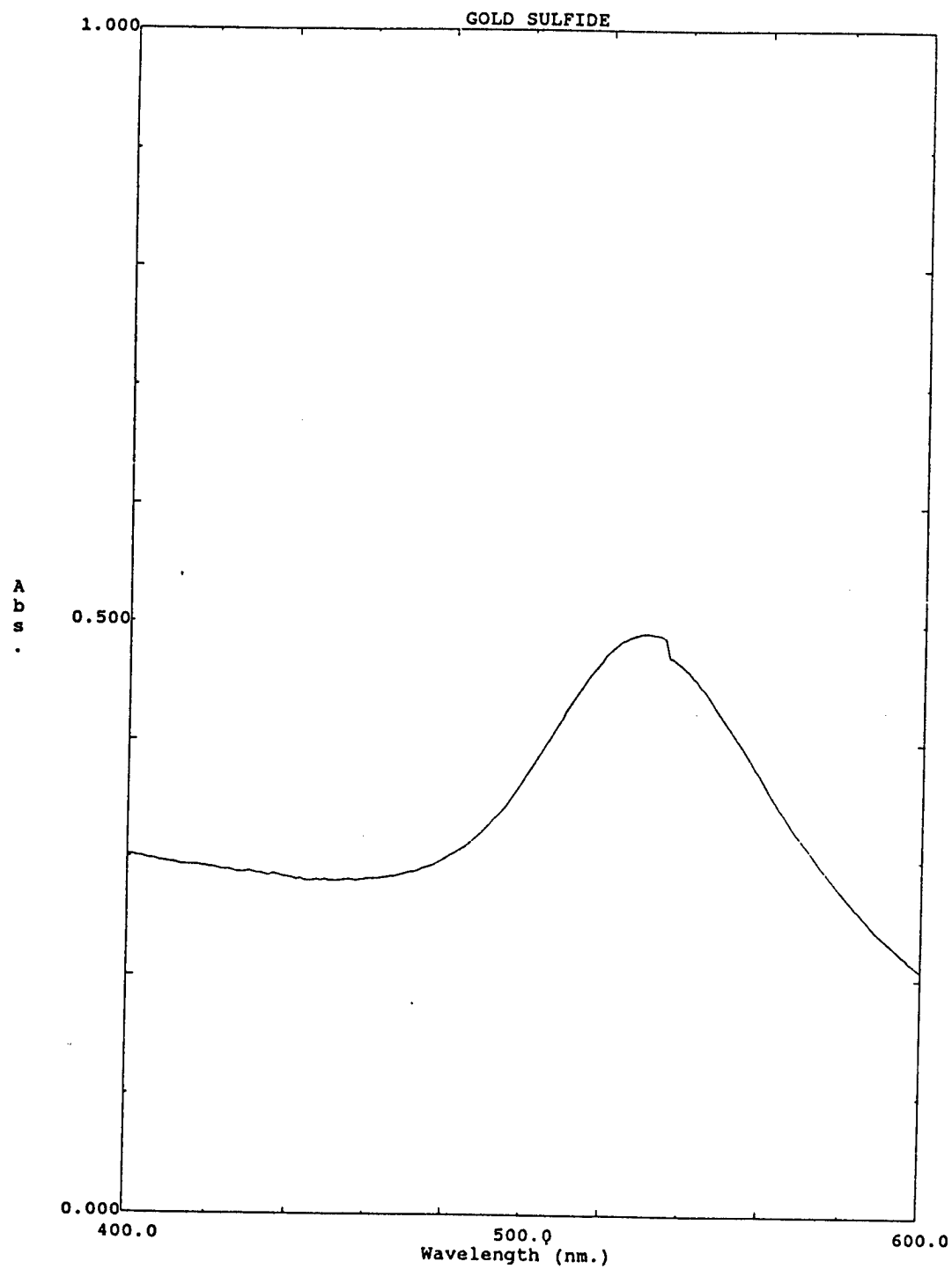


FIGURE 1.

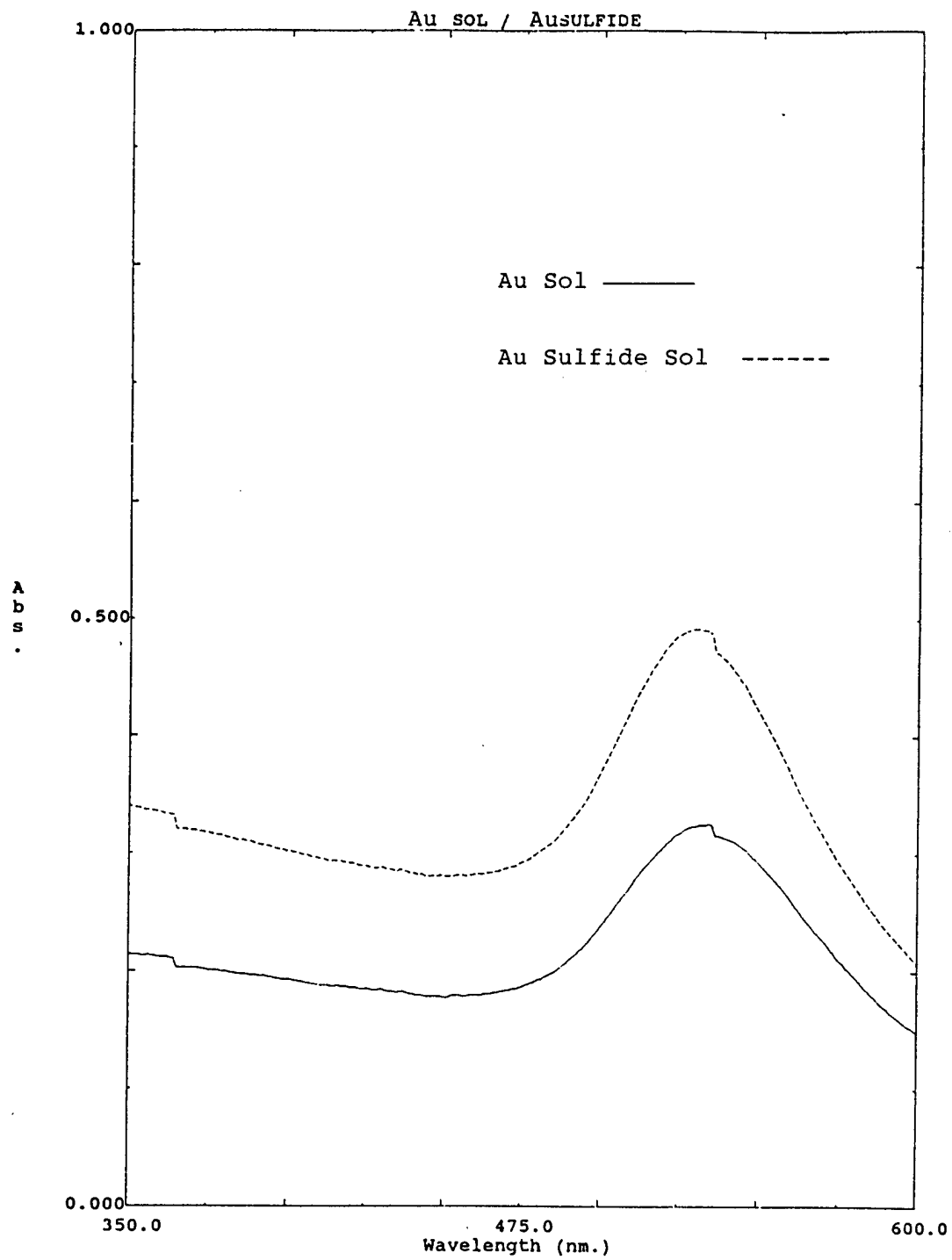


FIGURE 1A.

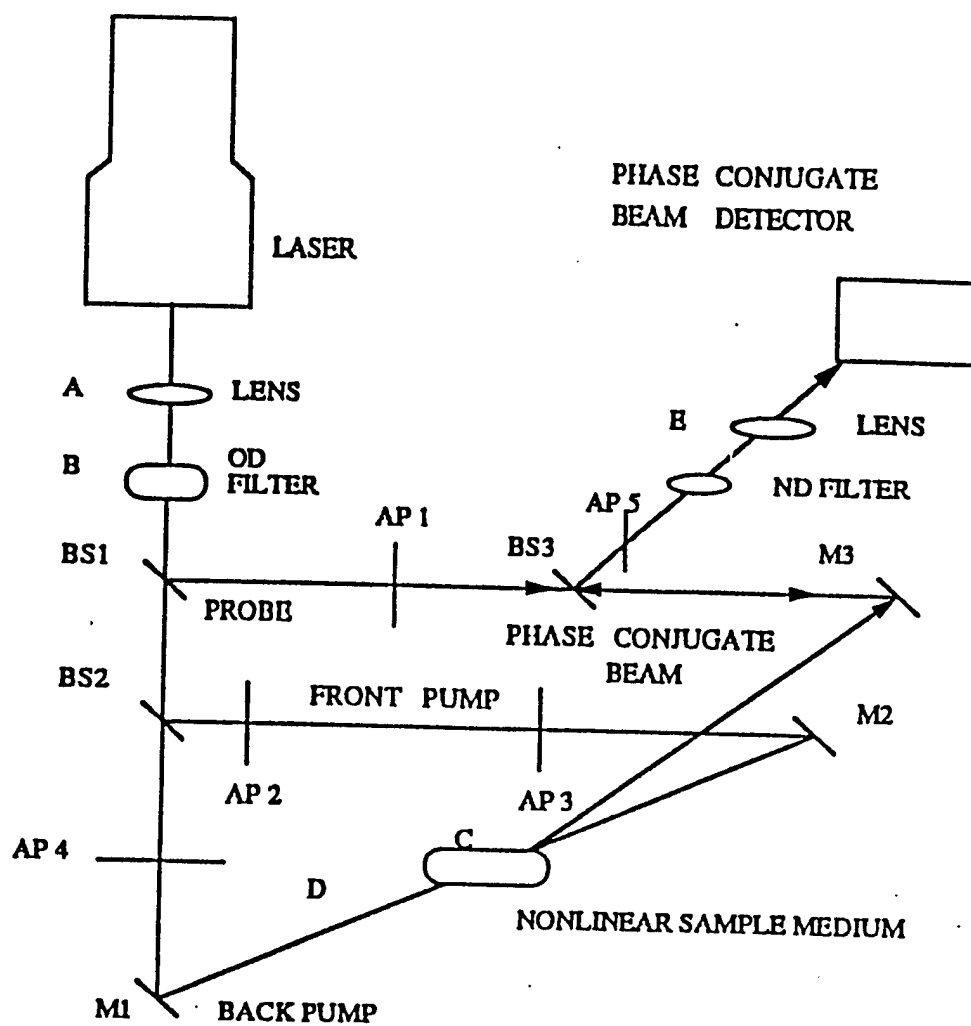


FIGURE 2. Experimental Arrangement for Degenerate Four-Wave Mixing

calculations was obtained from the log-log plot of phase conjugate signal intensity versus the laser intensity. Carbon disulfide was used as a reference. A similar plot was made for carbon disulfide at the same wavelength, 480nm.

The value of X^3 for gold sulfide was 7.73×10^{-12} esu.